**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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| Applicants: | T. Yamaguchi et al. | Attorney Docket No.: | NAII123496 |
| Application No.: | 10/506,720 | Art Unit: 1745 / Confirmation No: | 5176 |
| Filed: | March 10, 2005 | Examiner: | J.J. Rhee |
| Title: | ELECTROLYTE FILM AND SOLID POLYMER FUEL CELL USING THE SAME | | |

**RESPONSE AFTER NON-FINAL REJECTION**

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December 20, 2007

TO THE COMMISSIONER FOR PATENTS:

REMARKS

In response to the Office Action of September 20, 2007, Claims 1-10 are pending in the application and stand rejected. Reconsideration and allowance of Claims 1-10 in view of the following remarks is respectfully requested.

Rejection of Claims 1-10 under 35 U.S.C. §103(a)

Claims 1-10 are rejected under 35 U.S.C. §103(a) as being unpatentable over EP 1202365, issued to Yamaguchi et al. (Yamaguchi) in view of U.S. Patent No. 5,910,357, issued to Hachisuka et al. (Hachisuka). Withdrawal of the rejection is respectfully requested for the following reasons.

Claim 1 relates to an electrolyte membrane having a porous substrate with the following characteristics:

(a) a porous substrate having pores that are filled with a first polymer having proton conductivity that imparts proton conductivity to the electrolyte membrane, and

(b) a porous substrate comprised of

(i) a second polymer that is a crosslinked polyolefin, and

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(ii) a third polymer having a carbon-carbon double bond.

Claims 2-10 depend from Claim 1.

The Yamaguchi reference discloses an electrolyte membrane made of a porous substrate filled with a polymer having proton conductivity. The monomers used to make polymers filling the holes in the porous substrate can be acrylic acid (AA) (column 4, line 16), or monomers having vinyl groups and strong acid groups such as sulfonic acid (column 4, lines 15-16).

The Hachisuka reference discloses a separation membrane comprising shape memory polymers. The membrane can control its permselectivity and its fouled pores can be easily washed by using the reversible shape change of the membrane.

Admitting that the Yamaguchi reference fails to disclose that the porous substrate comprises a crosslinked second polymer wherein the second polymers are crosslinked with one another and a third polymer has a carbon-carbon double bond, the Examiner states that the Hachisuka reference teaches a porous substrate comprises a crosslinked second polymer and a carbon-carbon double bond-containing a third polymer. The Examiner concludes that it would have been obvious to a person skilled in the art to combine the teachings from the Yamaguchi and the Hachisuka references to arrive at the claimed invention. Applicants respectfully disagree.

The Yamaguchi reference teaches away from using a shape memory polymer of the Hachisuka reference in making the porous substrate of the claimed invention.

There are two important features in the claimed invention: (a) use of a crosslinked second polymer (i.e., crosslinked polyolefin) in a porous substrate for an electrolyte membrane; and (b) use of a third polymer having a C=C bond in the molecule in the porous substrate. The use of these two specific types of polymers achieves the desirable features of (1) the inhibition of permeation of methanol; (b) no or reduced change in the surface area of the electrolyte membrane; and (c) excellent proton conductivity to the claimed electrolyte membrane.



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The Hachisuka reference discloses shape memory polymer that can reversibly change its shape in response to any factors such as temperature, pressure, humidity, solvents, pH, photoreaction, electricity, chelation, and redox reaction (column 4, lines 49-54). On column 2, lines 48-52, Hachisuka teaches that "a shape memory polymer is a polymer that can change its shape "A" into another shape "B" (plastic deformation), fixing its shape by cooling, for example, and recovering its original shape "A" by heating the polymer again." Therefore, the shape-changeable polymer described in the Hachisuka reference is contrary to the property of no or reduced change in the surface area of the electrolyte membrane of the claimed invention.

The Yamaguchi reference requires that the electrolyte membrane be made of a porous substrate that does not swell substantially with methanol and water. See Abstract. In fact, throughout the reference, Yamaguchi stresses the importance of a porous substrate having swell-resistance against organic solvent and water and being endurable in a high-temperature environment. See, for example, Abstract; column 2, lines 1-4 and 22; column 3, lines 22-24; column 6, lines 56-57; column 9, lines 1-3, 20, and 40-41. Therefore, the shape-changeable polymer described in the Hachisuka reference is the exact type of polymer that the Yamaguchi reference teaches away from.

Because the cited references do not teach, suggest, provide any motivation to make, or otherwise render obvious the claimed invention, the claimed invention is nonobvious and patentable over the cited references. Withdrawal of the rejection is respectfully requested.



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## CONCLUSION

In view of foregoing remarks, applicants believe that Claims 1-10 are in condition for allowance. If any issue remains that may be expeditiously addressed in a telephone interview, the Examiner is encouraged to telephone applicants' attorney at the number listed below.

Respectfully submitted,

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